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Critical issues and policies for sustainable development: energy, transport and water

Report of the High-level Advisory Board on Sustainable Development for the 1997 review of the Rio commitments

Addendum

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INTRODUCTION

1. The United Nations Conference on Environment and Development (UNCED) was a milestone in linking environment and development. It adopted an international strategy for sustainable development, established goals and action plans for implementing sustainable development, defined responsibilities, and made commitments to provide financial resources and transfer technology to the developing countries.

2. It was already obvious at UNCED that the achievements of the Conference would depend entirely on the practical follow-up to the legal, moral and political commitments that were made. Although much progress has been achieved, especially in broadening awareness of the close interaction between development and the environment, it must be acknowledged that many of the targets of Agenda 21[1] are a long way from being met and will not be met without a sustained resurgence of the spirit of cooperation and commitment that characterized UNCED. Some developed countries, for example, will only partially achieve the targets that they accepted under the United Nations Framework Convention on Climate Change and the official development assistance (ODA) commitments that they made at UNCED.

3. The High-level Advisory Board on Sustainable Development does not think that the solution to the discrepancy between aspiration and achievement in securing responsible and sustainable development lies in changing the commitments of Agenda 21. What is needed is the mobilization of forces at all levels - global, regional, subregional, national and local - and the forging of new alliances between those forces to attain the agreed goals.

4. The general basis for securing sustainable development is the presence of adequate institutions, knowledge, skills and access to technology and financial resources, which will need to converge in the design and demonstration of sustainable - that is, responsible in a long-term perspective - ways of managing the environment, producing goods and services, meeting basic needs, and improving the economic and social standards of living for the world as a whole, especially for the poorest communities. Achieving those goals will require the empowerment and participation of the people affected, which in turn can best and most effectively be brought about within the framework of a functioning democratic system. A strongly motivated sustainable development constituency, endowed by its members with the necessary local and national financial support, must be cultivated.

5. Since the very essence of a democratic system is competition between views and interests which are at variance with each other, it is evident that clear incentives must be created for achieving sustainable development. Politicians must not be allowed to abdicate their crucial role in designing development strategies and regulating market activities; but without market forces working in the desired direction, politicians will face insurmountable difficulties in fostering sustainable development. Well-organized and creative political and civic leadership will be needed to design and implement policies for rallying special interests that otherwise would not work in the direction of sustainable development.

6. The present report must be seen as one of many inputs to the 1997 UNCED review process. The Board has concentrated on the areas of energy, water and transportation, because they are of paramount importance for sustainable development in the coming decades. After briefly reviewing the achievements of UNCED and continuing impediments to sustainable development, the present report identifies a way forward that includes fiscally responsible government actions, more effective economic incentives, improvement in the enabling conditions for change, and other market-oriented policies designed to optimize sustainable development in the areas of energy, water and transportation, while building in a concern for social equity. The Board's recommendations for action are presented throughout the report together with the rationale for the recommendations and a consideration of their implications. For ease of reference, recommendations are highlighted in bold type. In addition, a number of important terms and acronyms are defined in annex II.

I. THE ACHIEVEMENTS OF THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

7. UNCED demonstrated the common desire of all countries to establish global partnerships and make concerted efforts towards sustainable development. UNCED and its follow-up processes have played an important role in promoting global cooperation to facilitate strategies for sustainable development. Many countries have formulated their own Agenda 21 programmes for sustainable development and have integrated them into their long-term economic and social development programmes. In spite of the fact that there have been problems and difficulties in implementing the commitments made at UNCED, the significance and role of the Conference should not be underestimated.

8. Sustainable development is not a static and dogmatic concept concerning only the environment. It is a dynamic long-term process, including economic and social development as essential elements, seen in perspectives that may change over time, and leading to improved quality of life for all human beings, the eradication of poverty and the reduction of inequality. The concept of sustainable development carries inherent tensions, in particular between short-term economic needs and expectations and the demands of political and social stability, on the one hand, and the goal of long-term sustainability for future generations on the other. Implementing sustainable development is therefore inevitably an incremental process that needs to be re-evaluated and reinforced as it proceeds.

9. Since UNCED, the concept and the principles of sustainable development have been increasingly accepted, reaffirmed and, in certain respects, developed into concrete programmes by subsequent high-level conferences and meetings. Particular areas have been developed by the 1993 World Conference on Human Rights at Vienna, the 1994 International Conference on Population and Development at Cairo, the 1995 World Summit for Social Development at Copenhagen, the 1995 Fourth World Conference on Women at Beijing, the 1996 United Nations Conference on Human Settlements (Habitat II) at Istanbul and the 1996 World Food Summit in Rome, as well as by the 1994 Global Conference on the Sustainable Development of Small Island Developing States at Bridgetown, Barbados. The UNCED principles have been extended through the adoption of the

United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa, in 1994, and follow-up work on the 1992 United Nations Framework Convention on Climate Change and the Convention on Biodiversity. Regional conferences have also made important contributions to the development and implementation of sustainable development.

10. Statements by Governments, business leaders and organizations of civil society have repeatedly proclaimed the need to protect the environment, conserve natural resources, preserve social peace and democracy, eradicate poverty, eliminate racial and gender discrimination, and promote sustainable patterns of production and consumption. While those statements of principle are often not followed by substantive action, it is important to capitalize on them to enhance the evolving culture of sustainable development and to promote concrete actions by Governments, business and civil society. That process will require clear and realistic priorities in order to ensure the realization of existing commitments on the transfer of financial resources and technology.

II. IMPEDIMENTS TO SUSTAINABLE DEVELOPMENT

11. Since UNCED, political action in many countries has led to considerable progress in increasing recognition of the need for sustainable development; but the five years that have elapsed since UNCED have not on the whole been enough for that recognition to have been translated into concrete action producing identifiable results. Given that the establishment of sustainable development practices is a long-term process, the Board believes that the political will to achieve sustainable development must be greatly strengthened in all countries and at all levels of government.

A. Globalization

12. Globalization of the world economy contributes substantially to development through increased international trade, investment flows and information exchange. With globalization, however, the effectiveness of national public policy requires greater cooperative effort by all Governments in a multilateral framework. Since markets do not take into account external costs, Governments at both the national level and within the framework of multilateral agreements need to develop and implement policy instruments for ensuring the sustainability of development in the globalized economy. The Board wishes to emphasize its concern with that issue and intends to return to it in the future.

B. Environmental concerns as priority concerns

13. The advocates of sustainable development have not yet succeeded in raising environmental concerns to a high priority in all countries. The perception remains in some quarters that environmental protection is something that can and should be addressed only when a country is rich enough to do so, and that it is a "low rate of return" activity. Yet the evidence is mounting that local environmental destruction can accelerate the poverty spiral not only for future

generations but even for today's population. It is obvious that countries which recklessly deplete their natural resources are destroying the basis of prosperity for future generations, but few policy makers have been able to persuade their constituents that as forests disappear and water is exhausted or polluted, it is the poor of today, especially children and women, who suffer most.

14. Low-income households, communities and countries have very limited resources for investing in environmental protection or taking risks on new sustainable livelihoods. Wealthier individuals, communities and countries will not only have to adopt more sustainable patterns of production and consumption for themselves but will also have to bear most of the economic burden of the changes that will be required of low-income people and countries for global sustainability. The transition from current production and consumption patterns to sustainable development, which may constrain short-term economic growth and create hardships for people in some economic activities, must take into account the need for social and political stability and the need for Governments to maintain the confidence and support of their populations.

C. Official aid

15. It is disturbing that ODA levels have fallen in real terms from over $60 billion per year (1994 dollars) in the early 1990s to about $55 billion in 1995. Despite the concomitant increase in private capital flows, which have been concentrated in a relatively few countries, ODA remains an essential element for sustainable development, especially in least developed and other vulnerable countries, and the commitments for new and additional resources should therefore be met.

16. The Global Environment Facility (GEF) was created to cover the incremental costs to developing countries of implementing projects and programmes addressing selected global environmental problems. However, the incremental costs of switching from dirty to clean technologies across a whole range of economic sectors will vastly exceed the funding available to GEF. Moreover, instead of placing new and additional resources at the disposal of developing countries to secure global benefits, GEF funding consists, at least partly, of diversions from conventional aid funds.

III. THE WAY FORWARD

17. The way forward should consist of several sets of actions emerging from a focus on capacities and incentives and pursued simultaneously. There is a need for increased effort and investment in sustainable development, particularly in developing countries, but there is much that can be done by making better use of existing resources for sustainable development through the better management and deployment of resources.

18. The Board considers Agenda 21, as it is, to be the starting point for the necessary further work towards sustainable development. Agenda 21 should be complemented, however, by the reaffirmed and somewhat enlarged commitments made

at the high-level conferences and meetings on different aspects of development held since 1992 so that all aspects of development are brought into an organic concept of sustainability. This is not a matter of choice; it is an imperative.

19. In the light of the above-mentioned impediments to sustainable development, a general framework for action is set out below. The Board considers that the proposals which it contains, together with the recommendations that follow in sections IV-VI on energy, transport and water, even if only partly implemented, would be sufficient to set the world on a path of sustainable development. There is no reason why all these areas of policy cannot be acted upon simultaneously.

A FRAMEWORK FOR ACTION

A. Making use of democracy

20. A key characteristic of good governance is that it is based on law. This makes it possible for citizens to foresee the legal and social consequences of their acts. Norms have to be created to secure a democratic framework as well as a sound economy. Only responsible political leadership can accomplish this. Furthermore, such leadership must not only organize itself to cope with clashes of interest on the national level but must also address the externalities of globalization, a challenge that is so formidable that it may well go beyond the traditional potential influence of the United Nations.

21. Citizens' rights and duties have to be properly established. **It is, not least in the perspective of development, of paramount importance to settle the question of property and resource use rights.** If they do not exist, they need to be created so that those who control assets have an incentive to conserve them rather than allowing them to degrade for fear that they will be appropriated by others. Legal regimes can be based on private or corporate property, where appropriate, but should also include community, government and international common property regimes.

22. Making true use of democracy and its mechanisms means that **all strata of societies should be given proper possibilities to voice their concerns.** This is applicable at the national, regional and international levels.

23. Sustainable development requires that greater use be made of the skills and knowledge possessed by women; **the empowerment and mobilization of women must be promoted as a requisite for positive change.** Reducing poverty means dealing with women's issues as a priority, including the implementation of the recommendations of the Fourth World Conference on Women (Beijing, 4-15 September 1995). Those recommendations should be reviewed and realistic targets established.

24. **The organizations and associations of civil society should be mobilized in the effort to achieve sustainable development through the principle of sharing responsibility.** Education programmes should enlighten and empower people to take responsibility for their own sustainable development and that of future generations, on an individual and collective basis. Non-governmental

organizations of all kinds - from religious organizations to labour unions and from general study circles to specialized environmental interest groups - can influence the general public as well as political decision makers to pay due attention to sustainability.

B. Education and information

25. It is now widely understood that the single most decisive factor in sustainable development is human capital. Developing human capital means emphasizing education and health, both as ends in themselves and as a means to economic growth and sustainable development. **A fundamental prerequisite for sustainable development is an adequately financed and effective educational system at all levels, particularly the primary and secondary levels, including a focus on the local environment in the context of sustainable development.** Adult literacy programmes that focus on environmental concerns should also be organized. Only an enlightened public opinion well aware of common values will be receptive to arguments that emphasize long-term benefits as opposed to immediate or more short-term benefits. Tertiary education should also be fostered in order to strengthen a cultural base that is receptive and able to absorb the new technologies and information flows necessary for sustainable development.

26. Education and information are crucial for making people understand the motives of and needs for sustainable development. **The efficiency of information dissemination and different techniques for that purpose need to be improved.** Moreover, the question of engendering a morally responsible and sustainable lifestyle goes beyond the question of information techniques, and must be addressed in the larger framework of each society's concept of quality of life.

27. In view of the lack of recognition of the economic importance of environmental sustainability, **the Board calls for better and more aggressive dissemination of the large body of research that shows the high economic value of properly managed natural resources.** Such efforts would address a failure of information, and would be relatively inexpensive to pursue.

C. Innovation and technology transfer

28. Research and development are central to sustainable development but are generally inadequately funded in developing countries. **Research and technology transfer must be supported, from long-term fundamental research to short-term applications, in order to build mature local bases of expertise and experience.** Development - the conversion of research results to practical applications - must rely on partnerships between developed and developing countries and among different economic sectors, making use of information technology. Technology transfer, if it is to be successful, not only requires an injection of capital but more importantly requires technically mature recipients fostered through research and development, and must be based on joint ventures and long-term collaborations.

29. The Board recognizes that in order for innovation and technology transfer to be successful in developing countries, it must be fostered taking into account the global shift from an industrially oriented development to one based on information technologies.

D. Creating markets and market-based instruments

30. A great deal of resource degradation takes place because some resources have no markets (markets are said to be "missing") or only limited markets ("incomplete" markets). Without a market for clean air, for example, the only means for achieving substantial improvements in air quality is direct regulation. While direct regulation has an important and continuing role to play, the costs of direct regulation are a major concern worldwide. As the Board has previously recommended, **a mix of regulatory and economic instruments that require and encourage companies to be safer, less polluting and more efficient in the use and management of resources should be used to create markets for resources and cleaner technologies.**

31. The creation of markets allows market forces to establish demand and supply for improved environmental quality and resource conservation, and to determine the least costly ways of meeting national or international standards. The many different means of creating and reinforcing resource and environmental markets include environmental charges and taxation, tradeable emission permits, tradeable resource-use quotas, tax-subsidy schemes, deposit-refund schemes and the elimination of subsidies. **Such mechanisms should be used to make the interplay between legislation and the market more effective, enabling society to effectively and efficiently regulate the management of natural resources, particularly when market forces are not sufficient by themselves.** The chlorofluorocarbon agreement serves as an example of how common understandings of a problem, and the order of magnitude of the costs of addressing it, led to intergovernmental regulation with positive effects on the market in spite of initial opposition by special interests.

32. The essence of market measures is that they raise the price of polluting and resource-intensive technologies relative to cleaner and resource-conserving technologies, thus providing a major stimulus to technological change. Even modest institutional changes of that sort can generate major economic responses, with substantial environmental benefits.

33. The most effective policy instruments will depend on the characteristics of a country. In colder climates, thermal efficiency standards for buildings are important. Sweden and the Netherlands, among other Organisation for Economic Cooperation and Development (OECD) countries, have established mandatory high standards for insulation. In tropical countries, standards for air conditioners and refrigeration are more important. In Singapore, where air conditioning is estimated to account for 25 per cent of total electricity consumption, mandatory standards for air conditioning and thermal efficiency have been incorporated into building regulations. Benefits can also be realized by reducing uneven consumption of electricity between day and night, for example through price incentives for shifting energy consumption to low-demand periods.

34. Consumer preferences, shaped by such instruments as eco-labelling, can also promote sustainable development. Eco-labelling criteria, however, may become disguised trade barriers, and the credibility of eco-labelling schemes can be undermined if different schemes proliferate. Several initiatives have been taken in the field of forestry, such as the Forest Stewardship Council's initiative to develop a widely acceptable criterion for eco-labelling in forestry, and similar efforts by the International Organization for Standardization (ISO). **Universally accepted guidelines for eco-labelling are urgently required.**

35. In some cases, neither direct regulation nor market-based instruments may be needed. **There is a growing trend towards "self-regulation", whereby corporations agree to establish their own measures and targets for improving environmental quality,** subject to some understanding that, if they fail, Governments may intervene and regulate. The emergence of voluntary agreements may be based on national or regional systems of environmental guidelines, such as the 33/50 programme in the United States of America, the BS 7750 standard in the United Kingdom of Great Britain and Northern Ireland, the Regulation on Eco-Management and Audit of the European Union, and the ISO 14000 environmental management standards. In some cases, voluntary programmes carried out in cooperation between private enterprises and government agencies have demonstrated methods for achieving greater environmental protection at lower cost than existing regulations.

36. The most effective market-based motivation is corporate self-interest. The environmental action plans of industrial corporations are largely devoted to reducing costs for energy and raw materials. Such planning should be encouraged, if only as a first step towards more comprehensive planning of environmentally sound production. Producers are also demanding clean production methods, not only from themselves but also from their subcontractors, are increasingly calculating costs in terms of life-cycles and environmental impacts, and are using their efforts for publicity and marketing purposes. **In order to make national market-based instruments effective in the international context, and to discourage "free riders", a global partnership based on multilateral regulation is needed.**

E. Trade policy

37. **Further efforts are required to make trade and environmental policy mutually supportive at the national, regional and global levels.** At the national level, frameworks need to be established to monitor the environmental and social impacts of trade liberalization so as to be able to design and implement effective policies to address any unintended negative consequences. It may be possible to integrate procedures for harmonizing trade and environmental policies into regional trading arrangements more quickly than into international trade agreements. However, it is essential to complete the task of reconciling the trade provisions of multilateral environmental agreements with the disciplines and dispute settlement procedures of the World Trade Organization.

F. Urban and rural dimensions

38. The greatest challenges to sustainable development arise at two extremes: in rural areas of low-income countries that have not had access to modern sustainable development technologies, and rapidly growing metropolitan areas with their high concentrations of economic activity and resource consumption. While most of the world's population and a disproportionate number of people in poverty still live in rural areas, the continuing rapid migration from rural areas to towns and cities will soon make the world population predominantly urban. The process of urbanization facilitates sustainable development by giving more people access to productive and sustainable technologies and reducing pressure on ecologically fragile areas; but it poses enormous problems for urban planning and management, which must meet the growing demand for energy, water and transportation, while coping with increasing volumes of solid, liquid and gaseous wastes.

39. Sustainable urban development must address an entire complex of needs, including provision of safe water and sanitation, protection of air quality, access to public transportation, control of congestion and noise, and disposal of waste. Technologies to address those problems exist, but the costs of developing urban infrastructure, particularly in already built-up areas, are extremely high. **Realistic pricing of public services and resources, perhaps through commercialization or privatization, while ensuring affordable basic services for low-income people, can be an essential element of financing urban infrastructure and public services.**

40. Where municipalities are not able to provide needed services, **community efforts to meet local needs can be encouraged, and small-scale credit can be made available to small businesses and the informal sector.** Broad participation in the planning and management of public services and infrastructure development, with public participation at the community level and interest group participation at the municipal level, will promote public involvement in the efficient operation and maintenance of public facilities.

41. In rural areas of developing countries, where large numbers of people do not have access to clean water, electricity or other modern energy sources, modern transportation and communications systems, and other requirements for development, the urgent need is to extend access to basic services, infrastructure and development opportunities as quickly as possible at affordable prices. However, low population densities, low incomes and often inhospitable terrain in rural areas make the extension of electricity grids and communication and transportation networks very expensive. **It is essential to develop low-cost approaches to basic services for low-income rural areas, with temporary subsidies or cross-subsidies, where necessary, to achieve the benefits of universal access to basic services and social integration.** Realistic pricing in areas currently receiving subsidized water, energy and transportation services could help mobilize resources for providing such services to unserved areas.

42. The development of rural areas, with improved access to water, energy and transportation, can lead both to environmental improvement, such as the replacement of fuelwood with clean energy, and environmental deterioration, such

as erosion, salination and deforestation as a result of increased agricultural intensity. **Sustainable rural development thus requires integrated planning for rural areas, with local participation, in the context of national development strategies.**

G. Regional and subregional cooperation

43. While it is obvious that global environmental threats, such as global warming, need to be tackled on a worldwide level, **many problems of resource degradation and environmental pollution arise and can most effectively be addressed at the regional level.** Examples include transboundary acid rain, the pollution of shared lakes and seas, competing demands for the waters of a river that flows through several countries and ocean pollution. In such contexts, countries may be discouraged from acting unilaterally to protect or conserve resources since their efforts may be undermined or neutralized by others who take advantage of the unilateral action for their own benefit without reciprocating. The key to effective regional cooperation lies in ensuring that each party is better off with a regional agreement than without it. The gains need not be solely environmental, social or financial, but could also be political, for example by ensuring an alliance with other affected countries and contributing to political stability. There are many examples of such regional cooperation, such as Europe's agreements on transboundary acid rain control, the Regional Seas Programme of the United Nations Environment Programme and the Zambezi River Basin Project. The chances of such agreements are highest: (a) when negotiations recognize that early agreement confers gains in terms of future cooperation, perhaps on quite different issues of common concern, and (b) when the costs of compliance are minimized. The second issue is important, and helps explain why global agreements can in some cases be successfully negotiated, such as the Montreal Protocol.

44. In view of the regional or subregional character of many environmental problems, as well as those that affect only a few countries, or even problems affecting a single country that is too poor to cope with them effectively, **it is necessary for regional and subregional organizations, such as the regional commissions, OECD, the European Union, the Association of South-East Asian Nations, the Southern African Development Community, the Southern Cone Common Market, the Asia Pacific Economic Cooperation Council, the Central American Common Market, the Caribbean Community and the Economic Community of West African States, to face that challenge through multilateralism.** Their political and economic capabilities should be joined with the financial resources of the Bretton Woods institutions, regional development banks and subregional funds. A good example of cooperation for solving regional environmental problems is the work of the Nordic Environment Finance Corporation and the Nordic Governments in the Baltic States, in the Russian Federation and in Eastern and Central Europe. Regional organizations concerned with trade should work to harmonize trade and environmental policies. An example of a subregional mechanism for that purpose is the Commission on Environmental Cooperation established by members of the North American Free Trade Agreement.

H. Economic reform and new finance

45. **The Board sees an urgent need to improve the efficiency of the use of existing resources for sustainable development.** This must involve structural reforms of political, social, educational and economic systems, implementation of accountability and the elimination of corruption in order to improve countries' absorptive capacities. This will lead to the emergence of self-supporting sustainable development and productive societies that are able to attract finance competitively through the market.

46. **The Board feels that new injections of capital for sustainable development are required in all countries, particularly developing countries.** That new capital is envisaged to come from a redirection of private capital from mature markets to markets with new absorptive capacity created for sustainable development; from the removal of existing subsidies; from domestic savings; from debt-relief; and from public monies, including increased ODA. Efforts should be made to provide the necessary flexibility to allow those reallocations to take place naturally in response to incentives.

IV. ENERGY

47. Due to the great size of the energy sector and its central role in all aspects of economic and social life, major changes in energy production and consumption patterns will occur only gradually. Promoting such changes will require a variety of coordinated measures to promote energy efficiency and conservation, including regulatory measures, research and development, and more rational pricing. **Each country should develop an integrated strategy for sustainable energy development, based on such measures and coordinated internationally through a global intergovernmental process. The Board recommends the initiation of an intergovernmental process, with appropriate linkages to the private sector and to non-governmental organizations, to develop an integrated approach to the implementation of energy policies with a view to achieving the energy-related objectives agreed at UNCED and the World Solar Summit, and in the United Nations Framework Convention on Climate Change.**

48. Energy is essential for development, but its production and use, if inefficient:

(a) Causes pollution, which has local and regional impacts on human health, especially in urban areas;

(b) Causes damage to crops, forests, water and biodiversity, and has global impacts through climate change;

(c) Wastes resources that could be reallocated to alternative uses for greater improvements to human welfare;

(d) Consumes non-renewable resources that will be needed by future generations.

Sustainable development, in both the short and long term, therefore requires a reorientation of the world's energy sectors to improve energy efficiency and to allow the accelerated development of renewable energy sources.

49. Price is a major factor affecting the efficient use of energy; as long as energy from different sources is not priced at its full cost, inclusive of the environmental damage it causes, there is no possibility of meeting the energy needs of the existing global population, let alone the needs of the expected increased population.

50. **The Board therefore recommends that all Governments, especially the Governments of OECD countries, seek to realize the benefits of revised energy pricing through:**

(a) Eliminating subsidies to energy production and consumption, especially to fossil fuels and nuclear energy, within 10 years;

(b) Rational pricing of energy to encourage conservation and efficient use, and to reflect energy life-cycle environmental damages and risks, taking into account the costs to future generations of depleting non-renewable resources.

51. Raising energy prices to reflect the full costs will:

(a) Raise energy efficiency by promoting the adoption of known conservation technologies;

(b) Encourage the development of new conservation technologies;

(c) Encourage a switch-over to renewable and low-carbon forms of energy;

(d) Encourage investment in the exploration and development of new energy supplies.

52. Attempts to raise energy prices, however, will meet a number of obstacles:

(a) Energy-supply industries will oppose such measures because of the short-term effect on the demand for their products;

(b) Energy-consuming industries will be concerned about the impact of raised energy prices on their costs of production and international competitiveness;

(c) Disadvantaged social groups may suffer from increased prices, particularly considering that a higher share of their income is spent on energy.

53. **Some of those obstacles can be reduced by:**

(a) Recycling energy tax revenues back to industry through reduced taxation on other industrial inputs, especially labour, thereby encouraging employment and at the same time discouraging excessive energy consumption, the "double dividend". That dual effect of energy taxation will help correct the

long-term unemployment problems that have arisen from the rising cost of labour relative to the price of energy;

(b) Utilizing some of the tax revenues to compensate low-income groups for higher prices;

(c) Ensuring that energy price rises are phased in on a gradual basis so that industry and households have time to adapt by revising their expectations about future energy prices and by improving their energy efficiency;

(d) Finding ways to minimize the impact of increasing prices on competitiveness, including through harmonization of policies among countries at similar levels of development.

54. The instruments for correcting energy prices might include:

(a) Removal of subsidies;

(b) Removal of irrational price controls;

(c) Carbon/energy taxes;

(d) Taxes on local and regional air pollutants (sulphur oxides, nitrogen oxides, particulates);

(e) Tradeable pollution permits on a national basis.

55. **The Board draws attention to the need to accelerate investment in energy conservation, in renewable forms of energy and in new generations of energy technology. The Board re-emphasizes the importance of full energy pricing, together with the many other policy weapons available for promoting such investments and the transition to new energy systems.** Estimates indicate that currently only about 10 per cent of financing for energy research and development is allocated to renewable energy.

56. Among the energy-sector investments under consideration by Governments and bilateral and multilateral agencies, the Board draws special attention to the multiple benefits that accrue from supplying electricity to the maximum feasible number of households. Those benefits go beyond the provision of heat and power to the ability to store food in hygienic conditions, the provision of light for children's schoolwork, improved education and literacy, and access to modern communications. **Provision of electricity to unserved populations should be a priority, undertaken on the basis of programmes for specific regions over periods of 5 to 10 years.** Improved access for small enterprises and microenterprises can also contribute to economic and social development.

57. In some cases, differential energy pricing, with different prices for different types of consumers, can be useful for achieving social and economic goals while promoting sustainable development. That is feasible for electricity, for example, although not for liquid transport fuels. Where differentiation is possible, low or "lifeline" tariffs may be given to poor households and very much higher tariffs to wealthier consumers, with the profits

from the latter being used to subsidize the cheaper tariffs for poorer consumers. Such cross-subsidies are widely practised in many countries and are recommended, but it is important that the average price for the sector reflect the full marginal costs of supply.

58. For urban low-income households, the problem is largely one of affordable connections to existing grids and avoiding the dangerous illegal connections that are often made. In those areas, lifeline pricing and cross-subsidization can contribute to making electricity affordable for all.

59. For rural areas not connected to grids, given the need for a transition from non-renewable to renewable energy sources, **the Board recommends a sustained programme of investment in decentralized rural energy schemes, based on renewable energy, where reasonable, with the incremental cost of such schemes to be met, where necessary, from global sources, such as the Global Environment Facility (GEF).**

60. Recommendations to raise the prices of energy have been made many times before. Considerable sensitivity remains about such measures, since one of their immediate effects is clearly to harm the budgets of households and companies, and there will be difficult adjustments to be made in many cases. Nonetheless, many such policy measures have been implemented, and subsidies have been removed or reduced in many countries. One way to introduce more rational pricing would be to eliminate politically motivated price controls, shifting the responsibility for determining and monitoring price guidelines to independent regulatory authorities, with consumer representation and acting within the framework of transparent rules.

61. As energy subsidies are reduced, financial resources are released for alternative uses, including compensation for particularly hard-hit groups of people. Compensation may also be indirect, for example by providing a public service that could not previously be afforded.

62. Price increases can be introduced gradually so that consumers develop an in-built expectation that energy prices will rise through time. That enables the price rise to be assimilated and enables consumers to adjust. In the United Kingdom of Great Britain and Northern Ireland, for example, gasoline prices increase each year by 3 per cent in real terms as the result of a policy measure adopted some years ago.

V. TRANSPORT

63. Transportation is central to social and economic development, for individual mobility, social integration, trade and commerce. However, the transport sector throughout the world shows alarming and deteriorating environmental trends, primarily due to increasing vehicle traffic. While new technologies and vehicle efficiency measures can yield environmental improvements - and it is of paramount importance that that potential be realized - the growth of traffic is likely to produce accelerated environmental and social deterioration in urban areas. **Alternative means of conveying people**

and freight at substantially lower social costs per ton-kilometre and person-kilometre must be developed and introduced.

64. Road transport and other forms of transportation to a lesser extent, impose social costs in the form of accidents; damage to human health from particulate matter, carbon monoxide, lead, volatile organic compounds and other pollutants; congestion; noise nuisance; community severance, the "barrier effect"; local air pollution; transboundary air pollution from nitrogen oxides and sulphur oxides; and global warming from carbon dioxide emissions.

65. Studies of the social costs of transportation, undertaken mostly in developed countries, are in broad agreement on the importance of (a) the motor car as the dominant source of external costs, and (b) accidents, air pollution, climate change and noise nuisance as the largest external costs. Further studies are needed on the costs of congestion and barrier effects - that is, interference by roads and traffic with pedestrians and cyclists and the severance of community communications - as well as on the impact on historic structures.

66. Urban congestion is partly a function of inadequate roads, but the provision of more and better roads has the effect of generating additional traffic, which reduces the benefit of the new roads. Congestion in many cities is caused by poor land-use planning, low road quality and inadequate traffic management as much as by insufficient quantity of roads. Congestion imposes significant costs in terms of foregone productivity: it takes up time and allocates it to unproductive waiting in traffic jams. More indirectly, it adds to stress and aggravation, reducing work productivity. Provision of dedicated traffic lanes for mass transit, removal of subsidies for parking space, and application of advanced technologies to road pricing are among the policies that can reduce congestion.

67. Imaginative and integrated approaches to transport planning are required since no single measure is likely to succeed by itself. The growth of long-distance transport and the non-local nature of many of the impacts of transport means that such planning must include local, national and regional authorities, including transportation, urban development and environmental agencies. **Broad participation is essential to the effectiveness of such planning, including representatives of public interest groups, communities and industry. Particular attention should be paid to ensuring that low-income communities have access to affordable public transportation systems and are involved in the planning of systems that serve them. Each country, with local participation and international coordination, should develop a long-term strategy for transport planning.**

68. **The Board considers that the best prospect for securing significant gains in the transport sector is yielded by a combination of policy measures, such as:**

(a) **Urban land-use planning, including improved measures for the revitalization of city and town centres, avoidance of out-of-town shopping complexes and better management of congested roadside space, as the Board has already recommended in its earlier work;**

(b) **Proper pricing of transport fuels, vehicle use, and road and parking space.** Measures to that end would include increasing gasoline and diesel taxation to encourage both reduced travel and the transition to low-pollution fuels, raising annual vehicle taxation, charging economic prices for parking space, and charging for the use of congested roads;

(c) **Investment in mass-transit systems, if necessary with subsidies, to reflect the environmental and social benefits of such systems.** Innovative sources of finance need to be found to meet the high capital costs of mass transit systems. An example of such an innovative finance source would be a levy on the increased property values arising from the system. Alternatively, road users other than mass transit might be surcharged to generate the necessary revenues for financing mass transit systems;

(d) **Road traffic management systems that give preference to high-occupancy vehicles;**

(e) **Rational allocation of spending on reducing the large costs due to transportation accidents;**

(f) **Use of innovative public-private partnerships for the financing, construction and maintenance of transportation systems;**

(g) **Encouragement of commercially motivated efforts by automobile manufacturers to develop electric or solar-powered vehicles or collective transportation schemes as alternatives to traditional automobiles;**

(h) **Promotion of the use of telecommunications and other information technologies to reduce transportation demand;**

(i) **Removal of the implicit subsidy for air traffic arising from the international agreement that precludes taxation of aviation kerosene.**

69. Opposition to such measures can be expected from groups with vested interests, but there is mounting evidence of public concern at the environmental costs of unconstrained road transport and business concern at the costs of congestion. There are, therefore, increasing prospects for building strategic alliances based on voluntary control agreements and cooperation among land-use planners, citizens and non-governmental organizations. However, that increasing concern by itself is unlikely to reverse trends in the near future.

70. **The Board therefore recommends that Governments throughout the world give urgent and serious attention to the potential for improving well-being and environmental quality through the programme of action outlined above. Such a programme of action should be targeted on several cities in the various regions of the developing world, with international collaboration between city authorities, urban planners, and bilateral and multilateral sources of finance. Blueprints for implementing such schemes should be available within five years.**

VI. WATER

71. Clean water is a vital resource for human existence. It is becoming increasingly scarce in a growing number of countries, and the various users - domestic, industrial, agricultural, aquaculture, hydropower, transportation, tourism, and infrastructure and receiving water maintenance - must compete for it. There is mounting evidence that in the next few decades, water scarcity may reach crisis proportions, especially in arid areas and large cities. Water is thus a major challenge to humanity, which hitherto has failed to give it the attention that it requires.

72. Many people still see water as a "free good", that is, something that should not be brought into the domain of economic pricing. That view is not only wrong but counterproductive since water supply does cost money and the money it absorbs has profitable uses elsewhere. It matters a great deal, then, that water be supplied efficiently and without making major demands on limited public resources. Efficient pricing becomes one of the most important ways of ensuring that public supplies are reliable and clean. The idea that water should be priced at low and "affordable" levels detracts from those efficiency requirements, and also ignores the fact that water subsidies have not benefited the poor. Moreover, the evidence suggests that when households participate in decision-making as the users of water, they make water utilities accountable, whereas currently they have little incentive to worry about the standards of provision. Sensibly priced water gives the householder a stake in its efficient provision while allowing cost recovery for the water utility, thereby reducing the demand for taxpayers' money for subsidies.

73. **The Board believes that rational prices, including all externalities, must be determined for all uses, and that processes must be developed to progressively move towards charging in accordance with such prices.** That objective must be achieved in a way that minimizes the economic and social dislocations of price restructuring. The development of future large water-supply systems must adopt pricing that reflects all external costs, including waterlogging; salinization; habitat alteration; impact on endangered species; long-term deterioration of water quality due to changing land-use practices in catchment areas; cultural and social dislocation; and the cost of imposed risks.

74. **Water resources should be managed on the scale of total river basins, including underground aquifers. Local, regional and international collaborations must be established to avoid conflicts within each river basin and its access basins.** Since the utilization of water resources is increasing as a result of growing populations, urbanization and industrialization, it is clear that river-basin planning processes should be put into place in all large river basins in developing countries in order to allow sustainable development of their water resources. Particular emphasis must be placed on encouraging countries that share a river basin to collaborate in order to optimize the use of their water resources and ensure sustainable developmen' Efforts should also be made to develop new technologies for the full opti tion of economic returns and resource sustainability throughout entire river basins.

75. **River basin authorities should effectively involve local authorities in their governance structures and avail themselves of expert consultants.**

Authorities in different countries, or in different regions of large countries, can benefit from exchanging experiences in dealing with similar issues.

76. There are many obstacles to improved management of freshwater resources:

(a) Conflicts between users of common water resources, especially when they are in different countries;

(b) Resistance to altering traditional water-use patterns, for example by reallocating water from agricultural to other uses;

(c) Resistance to pricing mechanisms in place of historical methods of allocating use rights, in part due to misplaced views that water is a free good.

Those obstacles, however, can be overcome through the proposed strategic planning process provided that all stakeholders are encouraged to contribute to that process.

77. Water should be viewed in the context of the whole water cycle from catchment to the treatment of waste water, including the maintenance of water storage basins (surface and subsurface) and the health of receiving basins. **Pricing structures must account for the costs associated with the sustainability of all components of the water cycle.**

78. **There is an urgent need to improve the efficiency of water use by reducing demand, improving delivery, recycling waste water and optimizing water-quality maintenance in storage basins.**

79. Large urban centres, especially in developing countries, have totally inadequate water delivery and waste management systems. Even those with waste-water treatment facilities have large sludge disposal problems. **New technologies must urgently be developed to solve those problems.**

80. **In addition to providing financial support, international cooperation might include the establishment of an international consultative research group on water,** which could, for example:

(a) Promote research and development on the efficient use of water;

(b) Invite contributions from engineers and behavioural scientists;

(c) Disseminate its findings through education and training, bearing in mind psychological attitudes and political issues.

81. **A high priority should be given to ensuring that all sectors of society in both urban and rural areas have access to adequate water and waste-water management.** That will require enlisting traditional technologies, community input and the development of new technologies. The Board believes that different river basins will require different solutions, and many will be better served by the enhancement of traditional solutions than by the construction of sophisticated modern installations.

VII. GENERAL RECOMMENDATIONS

82. The objective of the Board in preparing the present report has been to complement Agenda 21 with recommendations for concrete actions for its implementation in the critical areas of energy, transport and water. If even some of the actions proposed by the Board are carried out, a major step will have been taken on the road to sustainable development, not only in a direct practical way but also in providing examples of what can be achieved. The actions proposed in the present report, which have been highlighted in sections III to VI above, can be summarized in three general recommendations, as set out in paragraphs 83-85 below.

83. **There is an urgent need to strengthen democratic and participatory processes for planning and implementing sustainable development so as to involve all concerned social groups at the local, national, regional and international levels.**

84. **There is an urgent need to strengthen capacities for the efficient and sustainable use of resources through increased investments in scientific research, technological development, education and training, infrastructure development and the transfer of technology.**

85. **There is an urgent need to increase economic incentives for sustainable development based on full and comprehensive pricing that reflects all economic, social and environmental externalities, with targeted and explicit subsidies, where necessary, to prevent social dislocations and hardships for the disadvantaged.**

Notes

[1] Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and Corrigendum), resolution 1, annex II.

Annex I

SESSIONS OF THE BOARD HELD TO DATE AND SUBJECTS ADDRESSED

First session, 13 and 14 September 1993

Organizational session.

Second session, 17-22 March 1994

1. Linkages between economic, social and political development in a changing world.

2. New approaches to finance and technology.

3. Establishment of new partnerships between the United Nations and non-governmental entities.

Third session, 17-21 October 1994

1. Linkages between economic, social and political development in a changing world.

2. Value-based education for sustainability in the context of capacity-building.

3. Concrete ways of forging alliances.

Fourth session, 30 May-1 June 1995

1. Mobilizing finance for sustainable development.

2. Enhancing cooperation and coordination for sustainable development.

3. Alliances between the United Nations system and non-governmental partners.

Fifth session, 29-31 January 1996

1. The communications revolution and sustainable development.

2. Sustainable energy and transportation systems.

Sixth session, 4-6 September 1996

Organizational session for report for 1997 review.

Annex II

GLOSSARY OF IMPORTANT TERMS AND ACRONYMS

APEC: Asia Pacific Economic Cooperation Council, aims to promote consultation and cooperation and to lead to free-trade area, established in 1989; 18 members on both sides of the Pacific.

ASEAN: Association of South-East Asian Nations, forum for political, economic, social and cultural cooperation, leading to free-trade area, established in 1967; 7 members.

CACM: Central American Common Market, established in 1960; members are Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua.

CARICOM: Caribbean Community, common market, established in 1973; 14 members.

CEC: Commission on Environmental Cooperation, council of ministers and secretariat established under NAFTA (see below) to discuss environmental matters arising under NAFTA.

ECOWAS: Economic Community of West African States, established in 1975; 16 members.

Externalities: External costs, or externalities, represent the economic, social or environmental losses or benefits that result from the production of goods or services but are not included in the market price. They may include pollution, congestion, unemployment and noise. External costs can be *internalized* through taxes or subsidies, or by making producers or consumers responsible for eliminating or compensating the damage.

Free rider: An individual or institution that benefits from actions by others for the common good without contributing. In the case of public goods that benefit everybody whether or not they pay their share of the costs, such as clean air, there is little economic incentive to pay. Regulatory measures to require cost-sharing or economic incentives for participation may be required to discourage free riders.

MERCOSUR: Southern Cone Common Market, established as a free-trade area in 1991 and as a customs union in 1994; members are Argentina, Brazil, Paraguay and Uruguay.

NAFTA: North American Free Trade Agreement, took effect in 1994; members are Canada, Mexico and the United States of America.

NEFCO: Nordic Environment Finance Corporation, aims to provide credit financing and joint venture participation in environmental projects in Central and Eastern Europe, established in 1990; members are Denmark, Finland, Iceland, Norway and Sweden.

UNCED commitments: The United Nations Conference on Environment and Development (UNCED) was held at Rio de Janeiro from 3 to 14 June 1992; it adopted the Rio Declaration on Environment and Development, Agenda 21 (programme of action for sustainable development), and the Non-legally Binding Authoritative Statement of Principles for the Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests. The United Nations Framework Convention on Climate Change and the Convention on Biological Diversity, which were negotiated separately, were opened for signature at UNCED. The United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa, negotiations for which were initiated at UNCED, was adopted in 1994 and is considered part of the UNCED process.

UNEP Regional Seas Programme: United Nations Environment Programme activity, with 13 regional programmes; 10 of the programmes now have action plans defined by conventions and agreements, beginning with the Mediterranean Action Plan adopted in 1975.

World Solar Summit: Held at Harare on 16 and 17 September 1996; organized by the United Nations Educational, Scientific and Cultural Organization; adopted the Harare Declaration on Renewable Energy and Sustainable Development, and the World Solar Programme 1996-2005.

Zambezi River Basin Project, or Zambezi Project: Regional project developed with the assistance of the United Nations Environment Programme and managed by the Southern African Development Community, based on the Zambezi Action Plan adopted in 1987. The Action Plan focuses on information and data collection and dissemination, and integrated water management planning. The Zambezi River Basin is shared by eight countries: Angola, Botswana, Malawi, Mozambique, Namibia, the United Republic of Tanzania, Zambia and Zimbabwe.